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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/073,314 | 02/13/2002 | Kenji Hoshi | 020171 | 4466 |

38834 7590 02/25/2004

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EXAMINER

FARAHANI, DANA

ART UNIT PAPER NUMBER

2814

DATE MAILED: 02/25/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

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| | | | |
|------------------------------|--------------------------------------|-------------------------------------|--|
| Office Action Summary | Application No. 10/073,314 | Applicant(s) HOSHI ET AL. | |
| | Examiner Dana Farahani | Art Unit 2814 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11/19/03.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,4 and 13-16 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,4 and 13-16 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kepler et al., hereinafter Kepler (U.S. Patent 6,037,671) in view of Madurawe (U.S. Patent 6,624,524).

In regard to claim 13, Kepler discloses in figure 3 alignment marks (the marks shown below number 23 in the figure) in a line space pattern being divided by a micronized pattern.

Kepler does not disclose alignment marks are divided in a second direction perpendicular to a first direction, which the alignment marks are formed.

Madurawe discloses in figures 2A and 2B, alignment marks are formed in two directions perpendicular to each other. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the alignment marks of Kepler's structure as two perpendicular sub-sections in order to save space on the semiconductor body, in which the marks are formed.

In regard to claim 14, in Kepler, positions of the divisions 23 between the plurality of segments of the lines are offset from those of the divisions between the plurality of segments 22 of their adjacent lines.

3. Claims 1-4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kepler in view of the Patent Application Publication (U.S. 2001/0019401), issued to Irie et al., hereinafter Irie, and further in view of Hwang et al., hereinafter Hwang (U.S. Patent 6,162,675).

In regard to claim 1, Kepler discloses in figure 3, an alignment structure formed over a semiconductor wafer 21, each of alignment marks, shown as strip trenches in the figure, being divided by a micronized pattern.

Kepler does not disclose the micronized pattern having a size smaller than a resolution limit of an alignment sensor.

Irie discloses in figure 1, and at pages 4 and 5, paragraph [0066], that a density filter [of light] has light blocking portions, shaped as dots, wherein the size of the dots becomes less than the resolution limit of an optical system in which the density filter is used. Furthermore, Irie discloses this structure results in higher light attenuation rate (see the above mentioned paragraph). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to introduce the micronized pattern of the Kepler reference, such that it would have a smaller size than a resolution limit of an alignment sensor in order to increase the light attenuation rate.

Kepler does not disclose the micronized pattern having a pattern-forming margin larger than that of a device pattern formed over the semiconductor wafer Hwang discloses in figure 15, a DRAM cell with a device pattern margin (that is the pattern of gates 206). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make adjustments in alignment mark patterns in a particular masking situation to conform to the

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stepper used in the masking process. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955).

In regard to claim 2, the pattern in Kepler is a line and space pattern.

In regard to claim 3, in Kepler, each of lines constituting the line and space pattern is divided into a plurality of segments (see figure 3).

In regard to claim 4, in Kepler, positions of the divisions between the segments of the lines are offset from those of the divisions between the pluralities of segments of their adjacent lines.

4. Claims 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kepler in view of Madurawe, as applied to claim 13 above, and further in view of Hwang.

Kepler in view of Madurawe renders obvious the limitations in the claims, as discussed above, but does not expressly disclose a semiconductor device pattern is smaller than a margin of the alignment pattern. However, Kepler discloses at column 4, lines 41-45 that the dimensions of the marks are determined in a particular masking situation.

Hwang discloses in figure 15 a DRAM cell with a plurality of gates 206. It would have been obvious to one of ordinary skill in the art at the time of the invention to make adjustments in alignment mark patterns in a particular masking situation to conform to the stepper used in the masking process.

Response to Arguments

5. Applicants' arguments filed on 11/19/03 have been fully considered but they are not persuasive.

Applicants argue that in the Irie reference, one could not apply the way to divide the light attenuating portion of the density filter to the way to divide the alignment marks, since they are functional and structural differences between the two. Although, the filter is structurally different, note it functions like alignment marks. The filter attenuates light, and the alignment marks reflect or contrast light, so some other light receptive device can identify the pattern or location of the marks. In a sense, they each act as light transmittals, and therefore, one of ordinary skill in the art would have been motivated to use the idea in the filter, namely, the size of the light blocking (or transmitting) portion relative to the resolution limit, in the alignment marks.

Conclusion

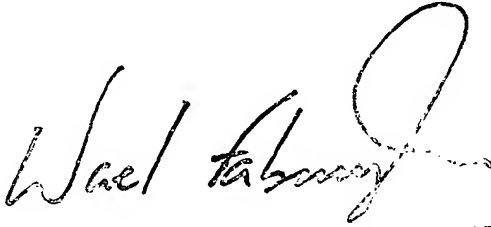
Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dana Farahani whose telephone number is (571)272-1706. The examiner can normally be reached on M-F 9:00AM - 6:00PM, Est. time.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M Fahmy can be reached on (571)272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

D. Farahani


SUPERVISORY PRIMARY EXAMINER
TECHNOLOGY CENTER 2800